

DSEAR RISK ASSESSMENT

Part 1

WORKPLACE ACTIVITY:	Oxy-Propane welding and pre-heating	DATE:	13/04/2022
EQUIPMENT/ ITEMS USED/SYSTEM DESCRIPTION: (SEE SCHEMATIC DIAGRAM)	<p>Oxy-Propane Welding Equipment</p> <p><i>Oxy-propane Welding - A process for joining two pieces of metal in which the required high temperature is obtained by the combustion of propane gas and oxygen. The gases are thoroughly mixed in the nozzle or tip of the welding torch to ensure perfect combustion. The weld may be formed directly between two adjoining surfaces, but usually metal from a welding rod is fused in between the surfaces of the joint.</i></p>		

PERSONS AT RISK- AFFECTED BY ACTIVITY:	<p>Personnel using welding booth / workshop</p> <p>Neighbouring properties</p> <p>Other company employees</p> <p>Contractors</p>	NUMBER	DSEAR/001
--	--	--------	-----------

LIST BY NAME THE PRODUCTS, PREPARATIONS OR SUBSTANCES BEING HANDLED, STORED OR PRODUCED:		
<i>Propane - (C₃H₈) Extremely flammable, can form explosive mixture with air, flammability range 2.4-9.5 vol% in air. Heavier than air.</i>	QUANTITY:	COSHH REFERENCE No: COSHH 019
<i>Oxygen - (O₂) Oxidant, strongly supports combustion, heavier than air.</i>	QUANTITY:	COSHH REFERENCE No: COSHH 020
	QUANTITY:	COSHH REFERENCE No:

IF PROPRIETY PRODUCTS OR PREPARATIONS ARE USED, DOES THE HAZARD INFORMATION CONTAINED WITHIN THE MATERIAL SAFETY DATA SHEETS, OR ON THE MATERIAL SAFETY DATA SHEET FOR THE PRODUCT DENOTE ANY OF THE FOLLOWING:											
	YES	NO		YES	NO		YES	NO		YES	NO
EXPLOSIVES	✓		OXIDISING	✓		EXTREMELY FLAMMABLE	✓		HIGHLY FLAMMABLE		

FLASH POINT < 55°C	✓		RELEASE VAPOUR, GAS, DUST			MIST OR SPRAY OF FLAMMABLE LIQUID			REACT WITH OTHER PRODUCTS OR SUBSTANCES USED	✓	
IF A SUBSTANCE IS PRODUCED AS A RESULT OF AN IN HOUSE PROCESS, OR AS A BI-PRODUCT OF SUCH A PROCESS, IS THAT SUBSTANCE EITHER/OR PRODUCE:											
	YES	NO		YES	NO		YES	NO		YES	NO
EXPLOSIVES			OXIDISING			EXTREMELY FLAMMABLE			HIGHLY FLAMMABLE		
FLASH POINT < 55°C			RELEASE VAPOUR, GAS, DUST			MIST OR SPRAY OF FLAMMABLE LIQUID			REACT WITH OTHER PRODUCTS OR SUBSTANCES USED		
NOTE: THE ABOVE MAY OCCUR IN AN ABNORMAL SITUATION AND AS SUCH SHOULD BE FULLY CONSIDERED IN ANY RISK ASSESSMENT											
IF THE ANSWER TO ALL OF THE ABOVE QUESTIONS IS NO , THEN A DSEAR RISK ASSESSMENT MAY NOT BE REQUIRED											

Part 2

IDENTIFIED RISK AND LOCATION	LIKELIHOOD OF			EXISTING CONTROL MEASURES	CONSEQUENCES OF IGNITION	SEVERITY	ASSESSED LEVEL OF RISK
	RELEASE	IGNITION SOURCE OCCURRING	EXPLOSION OR FIRE				
Fabrication Workshop and Assembly Production Floor							
Build up of an explosive atmosphere with potential for a confined vapour cloud explosion from accidental release of propane gas and/or enhanced fire/explosion from release of oxygen to atmosphere through: <ul style="list-style-type: none"> leaks in hose, joints, hose connections and fittings faulty flashback arrestor faulty non-return valves flashback from blowpipe damage to cylinder 	1	3	3	No oxypropane welding to be undertaken outside of booth; No use by unauthorised personnel Spare cylinders stored in designated external storage facility, Cylinders on all occasions to be transported in suitable cylinder trolleys by staff trained in manual handling techniques; On all occasions and at all times in use cylinders to be housed in chained trolleys; Cylinders located away from all sources of heat and flammable materials minimum distance 3m; Regulators, gauges, hoses, connections, hose assemblies, blowpipes, safety devices, etc compliant	Major damage to building and serious injury to fatalities	High	P5

IDENTIFIED RISK AND LOCATION	LIKELIHOOD OF			EXISTING CONTROL MEASURES	CONSEQUENCES OF IGNITION	SEVERITY	ASSESSED LEVEL OF RISK
	RELEASE	IGNITION SOURCE OCCURRING	EXPLOSION OR FIRE				
<ul style="list-style-type: none"> • damage to regulator 				<p>with all relevant British Standards (all inspections to be recorded in welding shop inspection manual);</p> <p>Regulators and flame arrestors serviced or replaced every 5 years, and inspected annually by a competent person and inspection recorded (record in welding shop manual);</p> <p>Maintenance and examinations of equipment by competent person; (all details to be recorded in welding shop inspection manual)</p> <p>Pre-use equipment check (date and sign daily log book);</p> <p>Dedicated LEV system for welding equipment, subjected to annual inspection/testing in accordance with statutory requirements (all testing/inspections to be recorded in welding shop manual);</p> <p>LEV system must be used when welding equipment in use, monitored/enforced by staff (all breaches to be reported to workshop manager);</p> <p>Workshop induction / training in use of equipment / LEV system operation for students (record in staff training file);</p> <p>With LEV in operation hoses are purged of any flammable mixtures of gases before blowpipe is lit;</p> <p>Equipment must not be used above manufacturer's recommended pressures;</p> <p>Hoses to be kept clear of sharp edges and abrasive surfaces, metal splatter to hoses to be avoided (adopt the company "clean as you go policy");</p>			

IDENTIFIED RISK AND LOCATION	LIKELIHOOD OF			EXISTING CONTROL MEASURES	CONSEQUENCES OF IGNITION	SEVERITY	ASSESSED LEVEL OF RISK
	RELEASE	IGNITION SOURCE OCCURRING	EXPLOSION OR FIRE				
				<p>Correct gas pressures and nozzle size for the job to be used;</p> <p>Air monitoring available upon request through workshop manager</p>			
Build up of an explosive atmosphere within the LEV ducting	0	0	0	<p>Specifically designed LEV system, filters changed in accordance with manufacturers recommendations (all testing/inspections to be recorded in welding shop manual);</p> <p>Workshop used for metals only - no other materials / substances are permitted to be extracted using the system (e.g. plastics, solvents, etc).</p> <p>LEV subjected to annual inspection/testing in accordance with statutory requirements (all testing/inspections to be recorded in welding shop manual);</p> <p>No alterations to the LEV permitted without consultation from workshop manager or specialised LEV contractor.</p> <p>No record or evidence of any explosion or potential explosion with the LEV since its installation.</p>	Major damage to building and serious injury to fatalities	High	P5
Other ignition sources other than the naked flame used for the blowtorch in normal operation	1	1	1	<p>No Smoking permitted throughout the entire building at all times</p> <p>Welding area surrounded by curtain screens</p> <p>No welding operations within immediate vicinity of any abrasive wheel grinding</p> <p>Earthing to LEV ducting to prevent static build up (Company electrician to monitor as per maintenance programme)</p> <p>All portable electric hand tools PAT certificated</p> <p>General inspections conducted by workshop manager</p>	Major damage to building and serious injury to fatalities	High	P5

IDENTIFIED RISK AND LOCATION	LIKELIHOOD OF			EXISTING CONTROL MEASURES	CONSEQUENCES OF IGNITION	SEVERITY	ASSESSED LEVEL OF RISK
	RELEASE	IGNITION SOURCE OCCURRING	EXPLOSION OR FIRE				
				<p>CCTV Security procedures + staff monitoring to prevent malicious ignition/arson</p> <p>Housekeeping inspections conducted on a weekly basis – records should be kept</p>			
Fire - general	1	3	3	<p>Remove all possible combustible material from welding area, protection for any combustible materials that cannot be moved from close contact with flame, heat, sparks or hot slag.</p> <p>Oil/grease must not come into contact with oxygen valves or cylinder fittings.</p> <p>Fire detection/alarm system, fire escape route, fire extinguishers, fire doors, trained fire marshals, signage, fire safety and evacuation procedures.</p> <p>Building and compound Fire Risk Assessment – FRA - (Fire Safety Order 2005)</p> <p>No flammable substances stored within the welding area. Dedicated flammable storage cupboard</p> <p>First Aid, Accident/Near-miss Reporting Procedures (all incidents to be reported and investigated by workshop manager)</p> <p>Good housekeeping/cleaning practices/procedures</p> <p>General inspections by workshop manager</p>	Major damage to building and serious injury to fatalities	High	P4
Cleaning and maintenance of equipment	1	1	1	<p>Oils/greases prohibited for lubrication of oxygen equipment.</p> <p>Only replacement parts specifically designed for oxygen use permitted</p>	Major damage to building and serious injury to fatalities	High	P5

IDENTIFIED RISK AND LOCATION	LIKELIHOOD OF			EXISTING CONTROL MEASURES	CONSEQUENCES OF IGNITION	SEVERITY	ASSESSED LEVEL OF RISK
	RELEASE	IGNITION SOURCE OCCURRING	EXPLOSION OR FIRE				
				<p>LEV annually inspected/tested by competent specialised contractor (all testing/inspections to be recorded in welding shop manual);</p> <p>Maintenance and examinations of equipment by competent person (all testing/inspections to be recorded in welding shop manual);</p> <p>Pre-attendance information provided to contractor regarding the risk of fire or explosion</p>			
Build up of an explosive atmosphere within the gas cylinder store.	1	0	0	<p>Natural ventilation, bottles shielded from direct sunlight.</p> <p>No other activities to be undertaken in cylinder store;</p> <p>Gas bottles securely chained whilst in store</p> <p>Security + CCTV monitoring – authorised persons only, key control access</p> <p>Signage</p> <p>General inspections by trained technical staff .</p>	Major damage to building and serious injury to fatalities	High	Low
Ignition sources within the gas cylinder store	1	0	0	<p>Cylinder store located away from all sources of heat and flammable materials, minimum distance 3M;</p> <p>No electrical equipment permitted within the store other than intrinsically safe gas detection monitors, intrinsically safe light fittings, no naked flames, surfaces or sources of mechanical energy;</p> <p>General inspections by workshop manager</p> <p>Security / CCTV surveillance</p> <p>Company fault or maintenance reporting procedures.</p>	Major damage to building and serious injury to fatalities	High	Low
Arrangements for safe transport	1	0	0	All transport off site undertaken by approved contractors (usually the gas supplier) with experience of transporting these gases.	Major damage to building and serious injury to fatalities	High	P5

IDENTIFIED RISK AND LOCATION	LIKELIHOOD OF			EXISTING CONTROL MEASURES	CONSEQUENCES OF IGNITION	SEVERITY	ASSESSED LEVEL OF RISK
	RELEASE	IGNITION SOURCE OCCURRING	EXPLOSION OR FIRE				
Arrangements for safe transport and disposal of waste	1	0	0	All transport off site undertaken by approved contractors (usually the gas supplier) with experience of transporting these gases.	Major damage to building and serious injury to fatalities	High	P5

CLASSIFICATION OF HAZARDOUS ZONES	
ZONE LOCATION	ZONE CLASSIFICATIONS
Gas cylinder store Class 2 (See additional controls below)	Class 2 Zone – consisting of a mixture with air and dangerous substances is not likely to occur in normal circumstances but, if it does occur, will persist for a short period only

Part 3

ADDITIONAL CONTROL MEASURES TO REDUCE THE RISK	PERSON RESPONSIBLE	COMPLETION DATE	RESIDUAL RISK P 1 – P5
<p>DSEAR Awareness training for all staff Annual Compressed gas safety training Emergency Accidental Release Procedures practised Formal written procedure for Oxy-propane Welding Pre-use equipment procedure checklist Use of proprietary leak detecting spray or solution suitable for use with oxy / fuel systems (as prescribed in welding shop inspection manual). Air monitoring whilst equipment is in use. Annual review of all fire safety control measures required – External training to be considered FRA to be reviewed annually by competent personnel and 3 yearly by external agency Annual shop floor close down for maintenance and refurbishment Maintenance and record keeping procedure (inspected daily by workshop manager) Compressed gas refresher safety training - Annually Pre-attendance contractor risk assessment required Contractor sign off procedure required Gas cylinder store requires Class 2 Zone (demarcation and signage) – (Class 2 Zone – consisting of a mixture with air and dangerous substances is not likely to occur in normal circumstances but, if it does occur, will persist for a short period only) Any procedural or key control misuse will be subject to automatic disciplinary procedure Documented inspections by workshop manager – Records should be kept</p>			<p>P5</p>

RISK ASSESSMENT CIRCULATION LIST (TICK BOX)			
EMPLOYEES		MANAGEMENT	CONTRACTORS
SIGNATURE OF RESPONSIBLE PERSON:			DATE:
ASSESSOR:	Mike Woodward	SIGNATURE:	<i>AM Woodward</i>
DATE ASSESSED:	08/12/2020	REVIEW DATE:	08/12/2020

Risk Assessment – DSEAR – Guidance

Information and Definitions:

The Dangerous Substances and Explosive Atmosphere Regulations (DSEAR) are concerned with protection against risks from fire, explosion and similar events arising from dangerous substances and potentially explosive atmosphere. All other risks should be assessed separately as required by other legislation e.g. The Control of Substances Hazardous to Health Regulations (COSHH)

Part 1

This should be completed for all DSEAR assessments. It is important that the system and use both in normal maintenance and abnormal situations is adequately described by a competent person. It is useful in most assessments to include a schematic diagram of the system; using such information will assist in understanding how the system works and the consequences of failure of the system as a whole or any of the component parts. For more complex systems additional quantitative analysis using safety engineering techniques such as fault tree analysis may be required.

When considering a particular installation the relevant dangerous substances and their properties need to be listed in this section. For proprietary products this information may be found on the products material safety data sheet. Where these consist of mixtures the information needs to reflect the percentage of the dangerous substance present. Where there is more than one dangerous substance in use the interaction of these substances, where possible needs to be considered.

In all cases completion of suitable and sufficient COSHH assessments should be undertaken before the DSEAR assessment.

Following reference to the material safety data sheet and COSHH assessments, where no listed hazards are identified a DSEAR assessment may not be required. In all cases advice should be taken from a competent person.

Part 2

This section assesses risks in terms of probability and consequence taking account of the existing control measures, utilising a risk matrix. Initially you must describe the identified risk and location, e.g. parts of the process, venting and exhaust points, leaking valves, sources of friction, hot surfaces, electrical arc or static discharge etc.

Likelihood of release: This is a figure between 0 and 3, dependant on the frequency and duration of a leak based on the following matrix:

3	Continuous (permanent or for long periods, release to the atmosphere during normal operations)
2	Primary (release expected during normal operations)
1	Secondary (release NOT expected during normal operations)
0	Negligible

In considering the likelihood of release consideration should be given to the ventilation of the installation, this information can be used to work out the likely accumulation of the dangerous substance or the ease to which the substance will disperse. Two primary factors should be considered, **type** and **degree of availability** of ventilation:

Type can typically be one of two:

Natural – In the open air or an open building with vents in walls/roof, designed with regard to the relative density of the gas/dust/vapour equivalent in open air

Artificial – general or local means of air movement/ air replacement within a building or open air to aid/control dispersal, often through powered ventilation.

Degree/availability is typically split into three categories:

VH – High ventilation – can reduce any concentration virtually instantly to below it Lower Explosive Level (LEL), resulting in a negligible zone extent, however subject to the ventilation reliability.

VM – Medium ventilation – can control any concentration whilst release is in progress to give a stable zone, so that an explosive atmosphere does not exist after the release has stopped.

VL – Low ventilation – CAN NOT control concentration whilst release is in progress, and/or cannot prevent persistence of explosive atmosphere after release has stopped.

Likelihood of ignition source occurring: This is a figure between 0 and 3, dependant on the likelihood of the ignition source occurring, this is a separate calculation and should be based purely on the ignition source. This should be considered for normal, maintenance and abnormal situations, where no ignition source is present you should complete the table with a 0.

3	Present continuously for long periods (>1000 hrs/year)
2	Likely to occur (>10 <1000 hrs/year)
1	Not likely to occur or infrequent and for short periods only (<10 hrs/year)
0	Not present

Likelihood of explosion or fire: This column is used to calculate the overall likelihood of explosion by multiplying the preceding figures together. This will give a figure with a value of up to nine. This initial assessment is undertaken to inform understanding of the consequences of ignition.

Existing control measures: This column should be used to detail the existing control measures to prevent/reduce the consequences of fire or explosion within a system, or where appropriate the planned/designed control measures where this assessment relates to task/activity/process not already in place.

Consequences of ignition/Severity: This column should be used to describe the consequences of ignition and subsequent fire or explosion. This should be supported with a High, Medium or Low risk rating in the severity column based on the following definitions:

High (H)	Major impact or major injury/fatality
Medium (M)	Serious impact or loss time injury
Low (L)	Minor impact resulting in first aid

Assessed level of risk:

Once the likelihood of an explosion or fire and the severity are known, the following matrix can be used to assess the level of risk. This matrix uses the earlier calculations entered into the risk assessment form.

Likelihood	Assessed Level of Risk			Release x Ignition calculation
	P3	P2	P1	6 – 9
P4	P3	P2	3 – 5	
P5	P4	P3	1 – 2	
Low	Medium	High		

	Consequences/Severity(Harm)
--	-----------------------------

This information will give the assessed level of risk P5 – P1 using the following risk definitions:

P1	Intolerable risk – work must not start or be continued until the risk is reduced further to an acceptable level
P2	Substantial risk – risk should be reduced further using risk reduction techniques
P3	Moderate risk – efforts should be made to reduce the risk further within a defined time period
P4	Risk is considered tolerable – monitoring required to ensure controls remains suitable and sufficient
P5	No action required

Classification of hazardous zones

Zone extent: Regulation 7 of DSEAR requires the classification of places at the workplace where explosive atmospheres may occur into hazardous or non hazardous places in accordance with Schedule 2 of the regulations: This schedule is reproduced here for the guidance of persons carrying out this risk assessment. In all cases, this assessment and subsequent classification should only be carried out by competent persons: Zone requirements should be detailed in Part 2 of the assessment as '*existing control measures*' or in Part 3 of the assessment as '*additional control measures*'. It is recommended that zoning is also included in the schematic diagram, used to complete the full risk assessment.

Zone 0 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.

Zone 1 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.

Zone 2 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Zone 20 - A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently.

Zone 21 - A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.

Zone 22 - A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Places where explosive atmospheres may occur

A place in which an explosive atmosphere may occur in such quantities as to require special precautions to protect the health and safety of the workers concerned is deemed to be hazardous within the meaning of these Regulations.

A place in which an explosive atmosphere is not expected to occur in such quantities as to require special precautions is deemed to be non-hazardous within the meaning of these Regulations.

Part 3

This section is used to identify action required, responsible persons, residual risk, details of the assessor, the assessments review period and circulation of the assessment; it should be fully completed as part of the assessment process using the following guidance:

Additional control measures: Where the assessment has identified a P2 – P5 assessed level of risk additional controls will be required to reduce the risk in so far as reasonably practicable. These additional controls should be listed, assigned to a responsible person and a target completion date entered. Following completion of these additional controls residual risk can be assessed using the P 1 – P5 risk definitions above.